National Institutes of Health
Warren Grant Magnuson Clinical Center
Nursing Department

PROCEDURE: BLOOD PRODUCTS: ADMINISTRATION

Approved by:

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PROCEDU/RE: **Blood Products: Administration**

ESSENTIAL INFORMATION:

1. Clinical Pathology and Transfusion Medicine Guide, http://aqua.cc.nih.gov/clinguide/cpd_main.asp
2. Nursing Department Policy: Infusion of Blood and Blood Components.
3. Department of Transfusion Medicine (DTM) Procedure: Infusion of Non-cryopreserved Cellular Components.
4. Circular of Information For the Use of Human Blood and Blood Components. American Association of Blood Banks. July 1998 (Distributed by DTM)

EQUIPMENT:

6ml purple top tube
Typenex band
Blood drawing materials
Blood Product Administration Set
0.9% Sodium Chloride IV Solution (if indicated)
Volumetric Infusion Pump
0.9% Sodium Chloride IV Solution and Tubing for emergency flush.
Three-way Stopcock
Leukocyte Depleting Filter (if indicated by DTM))

STEPS	**KEY POINTS**
1. Verify physician order for type and crossmatch.	
2. Place patient labels on 6 ml purple top tube. Patient label includes patient name and hospital ID#.	
3. Prepare Typenex band per instructions on Typenex box. Use a ballpoint pen and press hard when writing: patient name, ID#, date specimen collected, and initials of person collecting specimen.	3. Blood samples, which are missing any of this information, are rejected. A new sample will then need to be drawn and properly labeled.
a. Identify the patient using at least 2 forms of identification, ex., hospital identification bracelet, MIS data, asking the patient to state his/her name.	4. The major cause of acute transfusion-related death is error in identification. Patient identification is the most important step in the transfusion procedure.
5. Collect blood specimen in 6 ml purple top tube. If venipuncture required, use 20 gauge needle or larger for adults and a 22 or 23 gauge needle for children.	5. To prevent hemolysis of the blood sample, a 22 gauge needle or larger should be used to obtain the blood sample. The minimum sample volume needed is 1 ml, with 1 ml – 6 ml being the range for all patients
6. Apply Typenex band to patient per instructions on Typenex box.	6. a. Patient information must be visible on the white portion of the Typenex band. b. The crossmatch sample expires on 11:59 p.m. on

	the third day after the day it is drawn, i.e. a sample drawn anytime Tuesday the 23rd, will expire at 11:59 p.m. on Friday the 26th.
7. Check physician's order to determine: a. product to be administered b. number of units or volume to be administered c. date to be administered d. special processing e. duration of infusion f. pre-medication orders, if indicated	7. f. Allow 30 – 60 minutes for oral medications, 10 minutes for IV medications to become effective.
8. For whole blood, red blood cells or granulocytes, verify in the MIS, results of: a. blood grouping b. Rh type c. number of units crossmatched d. number of units set up	
9. Verify informed consent has been obtained and signed in the past year, except for emergency transfusions.	9. Date informed consent signed will remain in MIS for one year.
10. Ensure patient has Typenex band, and the inpatient is wearing hospital ID bracelet.	16. Typenex band is not required for products that are not crossmatched, e.g., platelets and plasma.
11. Establish or verify patency of peripheral or central venous access device.	17. When infusion pump is used, 20 gauge needle or larger is recommended to prevent lysis of red blood cells. 23-gauge needlecan be used for transfusing pediatric patients.
12. Obtain and record patient's baseline vital signs.	18. Febrile patients destroy cells rapidly. If febrile, notify physician to decide if transfusion can wait or if patient should receive acetaminophen as a pre- medication.
13. Verify that emergency medications are readily available in the area where patient will receive treatment.	
14. Ensure emergency equipment is available in patient's room: a. Normal saline flush solution b. Oxygen c. Suction machine d. Vital sign monitor	
15. When the patient is ready to be transfused, send MIS-O-GRAM to DTM to obtain specific blood product. Specify on MIS-O-GRAM infusion pump or gravity flow.	15.There should be a four hour time lapse between completing infusion of Amphotericin and beginning transfusion of granulocytes or vice versa. It is advisable that all other blood products be separated from Amphotericin by two hours. Blood products must be hung within 30 minutes of leaving the DTM refrigerator. DTM will usually only release one blood product at a time. Blood products MUST

	NEVER be placed in the refrigerator on the patient care unit.
16. Check the appearance of unit for presence of clots, clumps or abnormal cloudiness, and integrity of seals.	16. If appearance is suspicious, return it to DTM, as it may not be appropriate for infusion.
17. Two qualified health professionals trained in blood administration procedures compare: a. Blood product received on the unit to product requested in the medical order. b. Blood type and Rh type recorded in MIS with the container bag and container label ensuring that they are either identical or compatible. c. The blood product number on the blood container with the product number on the blood container tag. d. Compare the expiration date and time, if present, on the blood container label to the current date and time.	17. b. All three records must correspond exactly unless there is a message attached to the bag tag indicating a DTM physician's approval for transfusion of compatible but not identical ABO & Rh blood types. c. All identification attached to the container must remain attached until the transfusion has been terminated.
18. **Immediately before the transfusion, in the presence of the recipient,** two qualified health professionals identify the patient using at least 2 forms of identification: a. Verify the patient's name and medical record number on the blood unit with the information on the recipient's identification bracelet and the information recorded in MIS. b. Ask the patient to state his/her name. c. ***V***erify the Typenex number matches the information on the patient wristband and blood unit.	18. The major cause of acute transfusion-related death is error in identification. Proper patient and unit identification is one of the most important steps in the transfusion process. If any discrepancy is noted, notify DTM at once and return the blood product until the discrepancy is resolved. c. If no Typenex bracelet required (as in platelet transfusions), identify patients with patient hospital ID bracelet or hospital label and ask the patient to state their name. Correlate this information with blood component's tag.
19. a. Prime the administration set with the blood product or 0.9% Sodium Chloride. b. Add a three-way stopcock onto the end of the blood administration set. Have 0.9% Sodium Chloride solution and IV tubing unopened and available in room for emergency use or attached to stopcock. c. If a leukocyte-depletion filter is indicated, follow the manufacturer's and DTM instructions for set up.	19. a. Use of other IV solutions damages blood components. b. During a reaction, 0.9% Sodium Chloride may be administered through the stopcock without infusing the additional blood product in the tubing c. Leukocyte depletion filter may be used to prevent repeat febrile reactions, decrease the risk of CMV transmission, and decrease the risk of alloimmunization. Do not flush filter with saline. **Leukocyte depletion filters are not to be used when administering granulocytes.**

20. Connect the blood administration set to the IV extension set either directly or through the intermittent infusion cap via needleless system.	
21. For adults: a. Adjust the rate of flow to 2-5 cc/min during the first five minutes of platelets or plasma infusions or 2cc/min for the first 15 minutes for whole blood, RBC, or granulocytes. Patient should be observed closely for the first 15 minutes. For pediatric patients: b. Adjust the rate of flow to transfuse 5% of the total volume ordered in the first five minutes of platelet or plasma infusion or in the first 15 minutes of whole blood, RBC's or granulocyte infusion. Remain with the patient for the first 15 minutes after the start of the infusion. See Appendices A and B.	21. a. A volumetric infusion pump may be used to administer blood products. Symptoms of an immediate adverse reaction are usually manifested during infusion of the initial 50 cc. If an incompatible transfusion is terminated early, acute renal necrosis and death may be prevented. b. For pediatric patients, volume of blood products (excluding granulocytes) to be transfused should be ordered based on the child's weight, i.e. 10 - 15 ml/kg. See Appendices A and B.
22. At the end of the first 15 minutes, obtain and record TPR and BP. If vital signs are within normal range and the patient has no signs/symptoms of an adverse reaction, change the rate to infuse the unit within the time period specified in the physician's order.	22. The desirable rate of infusion depends upon patient's blood volume, cardiac status, and hemodynamic condition. Suggested rates for adults are: a. PRBCs: 100-230 cc/hr b. Granulocytes: 75-100 cc/hr c. Plasma/platelets: 200 – 300 cc/hr The volume of a plateletpheresis bag varies from 120 cc to 400 cc. The entire platelet product should be given within one hour, if possible. Suggested rates for pediatric patients are: a. PRBCs: 2-5 ml/kg/hr (see Appendices) b. Granulocytes: over 2-3 hrs (based on 200 ml volume) c. Plasma: 1-2 ml/minute; over less than 4 hours d. Platelets: as tolerated
23. Continue to monitor the patient for signs and symptoms of adverse reaction during transfusion and 1 hour post- transfusion. If patient experiences a transfusion reaction while transfusion is in progress, immediately stop the transfusion. Maintain patency of line with normal saline and notify MD.	23. a. Adverse transfusion reactions can occur anytime during or after the transfusion. b. For treatment of adverse transfusion reactions: see Clinical Pathology and Transfusion Medicine Guide "Adverse Reactions to Transfusions". c. Outpatient or DTM- if unable to monitor the patient 1 hour after the transfusion, provide patient information cards on "delayed

	transfusion reactions" (see appendix).
24. Complete transfusion as ordered not to exceed four hours. Tubing sets can be used for second unit of blood if used within four hours.	24. Increased possibility of contamination and decreased viability of cells if prolonged.
25. At the conclusion of a blood product transfusion in which no adverse reaction occurred: a. Obtain 10 - 60 minute post transfusion CBC for post-count as indicated. b. Flush the blood administration set with 0.9% Sodium Chloride until the tubing is clear. c. Obtain and record vital signs. d. Disconnect and discard the empty blood product container in a MPW box. e. If the outpatient is unable to remain for one hour post-transfusion, provide information on “Delayed Transfusion Reactions: (attached).	25. Do not flush leukocyte filters with saline.

DOCUMENTATION:

1. Enter consent date or update expired date on MIS screen.
2. The nurse will complete all information on MIS screen “Blood Component Charting” —pathway for “Start Blood Components”.
3. The nurse will complete all information on MIS screen “Blood Component Charting” —pathway for “End Blood Components - No transfusion Reaction Noted” or “End Blood Components - adverse Transfusion Reaction Noted” as indicated.

REFERENCES:

1. "Blood Transfusions: Playing It Safe", Nursing 96. 26 (4); 50 - 52. April 1996.
2. "Blood Transfusions: Keeping Your Patient Safe", Nursing 97. 27 (8); 34 - 42.
3. "Clinical Do's & don'ts: Safely Administer a Blood Transfusion. Nursing 94.
4. Terry, J., et al (eds.) Intravenous Therapy; Clinical Principles and Practice. Philadelphia, W.B. Saunders Co., 1995.
5. Handbook of Infusion Therapy. Springhouse, Pa. Springhouse Corporation, 1999, (pp. 192-216).

OUTPATIENT INSTRUCTIONS

AFTER THE BLOOD TRANSFUSION PROCEDURE

After the transfusion, you may resume your normal activities. Reactions to transfusion may sometimes be delayed for hours, days, or even weeks after the procedure. Symptoms of a delayed transfusion reaction are fever, headache, muscle aches, back pain and dark urine. If you think you are experiencing a delayed reaction to your transfusion: **It is very important to notify a member of your health care team as soon as the symptoms appe ar.**

Name

Telephone number

Appendix A:

Packed Red Blood Cells Administration Grid (PRBC)
(10 ml/kg)

Patient Weight	Amount of PRBC (10 ml/kg)	Starting Rate (first 15 minutes)	4 hr Infusion (2.5 ml/kg/hr)	3 hr Infustion (3.4 ml/kg/hr)	Max Infusion Rate (5 ml/kg/hr)	*Normal Fluid Maintenance Rate
3 kg	30 ml	6 ml/hr	8 ml/hr	10 ml/hr	15 ml/hr	13 ml/hr
4 kg	40 ml	8 ml/hr	10 ml/hr	14 ml/hr	20 ml/hr	17 ml/hr
5 kg	50 ml	10 ml/hr	13 ml/hr	17 ml/hr	25 ml/hr	21 ml/hr
6 kg	60 ml	12 ml/hr	15 ml/hr	20 ml/hr	30 ml/hr	25 ml/hr
7 kg	70 ml	14 ml/hr	18 ml/hr	24 ml/hr	35 ml/hr	29 ml/hr
8 kg	80 ml	16 ml/hr	20 ml/hr	27 ml/hr	40 ml/hr	33 ml/hr
9 kg	90 ml	18 ml/hr	23 ml/hr	31 ml/hr	45 ml/hr	38 ml/hr
10 kg	100 ml	20 ml/hr	25 ml/hr	34 ml/hr	50 ml/hr	42 ml/hr
11 kg	110 ml	22 ml/hr	28 ml/hr	37 ml/hr	55 ml/hr	44 ml/hr
12 kg	120 ml	24 ml/hr	30 ml/hr	41 ml/hr	60 ml/hr	46 ml/hr
13 kg	130 ml	26 ml/hr	33 ml/hr	44 ml/hr	65 ml/hr	48 ml/hr
14 kg	140 ml	28 ml/hr	35 ml/hr	48 ml/hr	70 ml/hr	50 ml/hr
15 kg	150 ml	30 ml/hr	38 ml/hr	51 ml/hr	75 ml/hr	52 ml/hr
16 kg	160 ml	32 ml/hr	40 ml/hr	54 ml/hr	80 ml/hr	54 ml/hr
17 kg	170 ml	34 ml/hr	42 ml/hr	58 ml/hr	85 ml/hr	56 ml/hr
18 kg	180 ml	36 ml/hr	45 ml/hr	61 ml/hr	90 ml/hr	58 ml/hr
19 kg	190 ml	38 ml/hr	48 ml/hr	65 ml/hr	95 ml/hr	60ml/hr
20 kg	200 ml	40 ml/hr	50 ml/hr	68 ml/hr	100 ml/hr	63 ml/hr
25 kg	250 ml	50 ml/hr	63 ml/hr	85 ml/hr	125 ml/hr	68 ml/hr
30 kg	300 ml	60 ml/hr	75 ml/hr	102 ml/hr	150 ml/hr	73 ml/hr
35 kg	350 ml	----------	----------	----------	---------	78 ml/hr
40 kg	400 ml	----------	----------	----------	---------	83 ml/hr
45 kg	450 ml	----------	----------	----------	---------	88 ml/hr
50 kg	500 ml	----------	----------	----------	---------	94 ml/hr

Pediatric Infusion Rate: 2 to 5 ml/kg/hr

*Maintenance rate is used only as a guideline.
For the non-compromised child, the infusion rate may be increased to 1.5 times the maintenance rate.

All Pediatric Oncology Patients should receive irradiated PRBCs

Appendix B:

Packed Red Blood Cells Administration Grid (PRBC) (15 ml/kg)

Patient Weight	Amount of PRBC (10 ml/kg)	Starting Rate (first 15 minutes)	4 hr Infusion (3.4 ml/kg/hr)	Max Infusion Rate (5 ml/kg/hr	*Normal Fluid Maintenance Rate
3 kg	45 ml	9 ml/hr	10 ml/ hr	15 ml/hr	13 ml/hr
4 kg	60 ml	12 ml/hr	13 ml/hr	20 ml/hr	17 ml/hr
5 kg	75 ml	15 ml/hr	16 ml/hr	25 ml/hr	21 ml/hr
6 kg	90 ml	18 ml/hr	19 ml/hr	30 ml/hr	25 ml/hr
7 kg	105 ml	21 ml/hr	22 ml/hr	35 ml/hr	29 ml/hr
8 kg	120 ml	24 ml/hr	26 ml/hr	40 ml/hr	33 ml/hr
9 kg	135 ml	27 ml/hr	29 ml/hr	45 ml/hr	38 ml/hr
10 kg	150 ml	30 ml/hr	32 ml/hr	50 ml/hr	42 ml/hr
11 kg	165 ml	33 ml/hr	35 ml/hr	55 ml/hr	44 ml/hr
12 kg	180 ml	36 ml/hr	38 ml/hr	60 ml/hr	46 ml/hr
13 kg	195 ml	39 ml/hr	42 ml/hr	65 ml/hr	48 ml/hr
14 kg	210 ml	42 ml/hr	45 ml/hr	70 ml/hr	50 ml/hr
15 kg	225 ml	45 ml/hr	48 ml/hr	75 ml/hr	52 ml/hr
16 kg	240 ml	48 ml/hr	51 ml/hr	80 ml/hr	54 ml/hr
17 kg	255 ml	51 ml/hr	54 ml/hr	85 ml/hr	56 ml/hr
18 kg	270 ml	54 ml/hr	58 ml/hr	90 ml/hr	58 ml/hr
19 kg	285 ml	57 ml/hr	61 ml/hr	95 ml/hr	60 ml/hr
20 kg	300 ml	60 ml/hr	64 ml/hr	100 ml/hr	63 ml/hr
25 kg	375 ml	---	---	---	68 ml/hr
30 kg	450 ml	---	---	---	73 ml/hr
35 kg	---	---	---	---	78 ml/hr
40 kg	---	---	---	---	83 ml/hr
45 kg	---	---	---	---	88 ml/hr
50 kg	---	---	---	---	94 ml/hr

Pediatric Infusion Rate: 2 to 5 ml/kg/hr

*Maintenance rate is used only as a guideline.
For the non-compromised child, the infusion rate may be increased to 1.5 times the maintenance rate.

All Pediatric Oncology patients should receive irradiated PRBCs.